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and disposing of all fluids generated during the removal action. Additional removal actions completed between 1996 and 1999, included cleaning and encapsulation of the PCB-contaminated vaults, removal of PCB-contaminated soil, and capping in-place seven building foundations.

Groundwater sampling completed during the OU-12 RI did not identify the UTS as a likely source of Flow Field 10 groundwater contamination.

3.6.3 SUMMARY OF RESPONSE ACTION SELECTED

This section presents the selected remedy for OU-12 (i.e., groundwater). The selected remedy includes No Action, No Further CERCLA Action, the Limited Action Alternative, and GMZ Alternative.

3.6.3.1 No Action

No Action is necessary for groundwater associated with the following sites because these source areas do not pose an unacceptable risk to human health and ecological receptors:

CSP/FAD
Drainage Ditches G-11 and G-12
SB
EGWST
Old PX Gas Station
RRMS
UTS

3.6.3.2 No Further CERCLA Action Plumes

No Further CERCLA Action is necessary for groundwater associated with the PH 8270 site and the DP site, and portions of the NDA and FTF sites. No Further CERCLA Action is necessary because CERCLA contaminants are not present at concentrations that pose an unacceptable risk under CERCLA to human health and ecological receptors. The petroleum-related contamination remaining at these source areas is not regulated under CERCLA. This petroleum-related contamination will continue to be addressed in accordance with applicable state requirements (i.e., MEDEP Chapter 691, Rules for Underground Oil Storage Facilities; and MEDEP Procedural Guidelines for Establishing Standards for the Remediation of Soil and Groundwater), including implementation of proper institutional controls. The No Further CERCLA Action decision for groundwater associated with these source areas does not constitute a finding by the USEPA that adequate protection has been achieved at these source areas.

The USAF shall, in consultation with the USEPA and MEDEP, consider the imposition of proper institutional controls to restrict the future use of groundwater associated with of the sites and assure proper notification of future property owners. The USAF is prepared to

initiate controls where it, the USEPA, and MEDEP determine that such controls would be appropriate.

3.6.3.3 Limited Action Alternative Plumes

The USAF and USEPA, with concurrence of the MEDEP, have determined that the Limited Action and GMZ Alternatives are the selected remedies for the remaining areas of OU-12.

The Limited Action Alternative has been selected for the following six plumes:

RMSA Plume
FSSB Plume
CSSA Plume
FTF South Plume
Upgradient BXSS Plume
Building 8711/JBW-7734 Plume

3.6.3.4 GMZ Alternative Plumes

The GMZ Alternative has been selected for the following 12 plumes:

ES/JEBS South Plume
BL Plume
JEBS North Plume
FLDD North Plume
VMB Plume
Central NDA Plume
PH 8210 Plume
FLDD South Plume
BXSS Plume
Quarry Plume
FJETC Plume
FTA Plume

3.6.3.5 Major Components of the Limited Action and GMZ Alternatives

The major components of the Limited Action Alternative and the GMZ Alternative are:

Establishment of GMZs;
Groundwater-use restrictions;
Provision of water supply;
Long-term monitoring;
Contingency action, if necessary; and
Five-year site reviews.

Establishment of GMZs

The USAF will establish GMZs based on the interpretation of site-specific groundwater contaminant distribution data collected during the OU-12 RI. Each GMZ will include a Contaminated Groundwater Area (i.e., an area of contaminated groundwater consisting of one or more of the delineated OU-12 plumes), outside of which will be the zone's Compliance Boundary; the Compliance Boundary for each zone will be established at a distance of approximately 100 to 500 feet from the edge of the Contaminated Groundwater Area (i.e., from the edge of the plume(s)). The Groundwater-Use Restriction Boundary will include not only the area within the Compliance Boundary but also a buffer zone between the Groundwater-Use Restriction Boundary and the Compliance Boundary.

Groundwater-use restrictions

The USAF will implement, maintain, and enforce institutional controls to eliminate the potential for human receptor exposure to contaminated groundwater within the Groundwater-Use Restriction Boundaries. These controls will consist of prohibiting the use of groundwater as a water supply and prohibiting the installation of future water supply wells within the Groundwater-Use Restriction Boundaries. Any use of groundwater within these boundaries will require the approval of the USAF, USEPA, and MEDEP. The restrictions on the use of groundwater will be maintained until contaminant concentrations within the Groundwater-Use Restriction Boundaries are reduced to less than the established RGs.

The USAF will include groundwater-use restrictions in any leases, deeds, or other property transfer documents; these use restrictions will apply to future transferees of any interest in property within the Groundwater-Use Restriction Boundaries. In addition to restricting the use of groundwater, any activities associated with maintenance of existing utilities, subsurface excavation, exploration, construction, or subsurface injection or discharge of water within the Groundwater-Use Restriction Boundaries will be prohibited without prior approval of the USAF, USEPA, and MEDEP. In accordance with the FFA, as amended, the USAF will develop, in consultation with the USEPA and MEDEP, the specific language to be included in any leases, deeds, or other property transfer documents regarding these institutional controls.

Provision of water supply

Because the use of groundwater will be restricted, the USAF will assure that an alternate supply of water will be available to future transferees of property within the Groundwater-Use Restriction Boundaries until contaminant concentrations are less than the established RGs. The provision of water will be consistent with projected future land uses as identified in the Disposal ROD (AFBCA, 1996). The USAF will determine a reasonable method for assuring water is available (e.g., the USAF could negotiate funding support for the water supplier based on water usage, the USAF could provide wellhead treatment within the Groundwater-Use Restriction Boundaries, the USAF could provide bottled water or otherwise transport water to users within the Groundwater-Use Restriction Boundaries, or the

USAF could provide hookup to municipal water systems). Such assurance shall not be construed as a commitment by the USAF to the expansion or increase in capacity of the existing water treatment and distribution system beyond that necessary to mitigate groundwater contamination concerns.

Long-term monitoring

Groundwater sampling will be conducted from existing monitoring wells and newly installed monitoring wells upgradient, within, and downgradient of the source area plumes. Monitoring will be conducted within the individual plumes to evaluate reduction in contaminant concentrations. Monitoring will also be conducted at the Compliance Boundary of each GMZ to ensure that groundwater with contaminant concentrations in excess of RGs is not migrating toward receptors outside the Groundwater-Use Restriction Boundary. Sampling and analysis results will be used to monitor the distribution of target contaminants for both the Limited Action Alternative and the GMZ Alternative. Additionally, the GMZ Alternative will monitor destructive attenuation mechanisms (e.g., biodegradation) and the effect of non-destructive natural attenuation processes (e.g., dispersion, dilution, sorption and precipitation). The number of monitoring wells will vary for each plume and GMZ. The specific number and location of monitoring wells, sampling frequency, methods and procedures, and data evaluation, management, and reporting requirements will be defined in the OU-12 LTMP. Surface water and sediment monitoring will also be conducted at selected groundwater discharge areas to confirm that these media are not being impacted by contaminated groundwater.

Contingency action

The OU-12 LTMP provides for groundwater sampling and monitoring to evaluate the effectiveness of the selected remedies for the Site. If contaminant concentrations at the Compliance Boundaries exceed the Federal MCLs or the state MEGs, the USAF will implement a contingency action. The contingency action may include collecting additional groundwater samples, installing additional monitoring wells, conducting a residual RA using the most recent data available, monitoring potential downgradient exposure points, evaluating other remedial alternatives, or other actions deemed appropriate. In combination with any of these potential actions, the Groundwater-Use Restriction Boundaries and/or Compliance Boundaries may be expanded.

Five-year site reviews

Five-year site reviews will be conducted to evaluate the overall effectiveness of the selected remedies at providing protection of human health and the environment. The five-year site reviews will also be used to evaluate contaminant reduction and statistical/trend analysis, reassess the estimated cleanup times, assess the validity of the conceptual and numerical models, provide recommendations for optimization of the LTM program, and determine the need for any further remedial actions. As part of the five-year site reviews, the USAF will conduct a review of new technologies that might be applicable for any portions of OU-12

where Technical Impracticability (TI) waivers have been granted. The USAF will also provide a synopsis of no more than three pages per technology that evaluates the implementability, effectiveness, and cost of the new potential technologies that are identified.

In addition to implementing the GMZ Alternative for the Quarry Plume, a small scale study will be conducted to evaluate DNAPL mass reduction technologies at the Quarry site.

DNAPL Reduction Program, Quarry Site

The USAF agrees to make available funding of $250,000 (two hundred fifty thousand dollars) for limited scale implementation of DNAPL mass reduction technologies at the Quarry site, and has included a request for this funding in the Fiscal Year 2000 budget. The USAF will coordinate with USEPA Region I and the MEDEP to establish a program whereby the Quarry site could be used to integrate USAF funded mass reduction efforts with State and USEPA supported research. The USAF developed a consensus statement mutually with the MEDEP and USEPA Region I, which established a process to coordinate and approve projects at the Quarry site as well as administer the distribution of USAF remedial funds. Any dispute regarding the established process will be resolved pursuant to the procedures set forth in the FFA. The objective of this program is to reduce contaminant mass at the Quarry site while developing an improved understanding of the mechanisms controlling DNAPL and dissolved phase contaminant behavior in fractured bedrock systems.

3.6.3.6 Remediation Goals

The RGs for OU-12 were established in the ROD and are listed in Tables 3.6–1 and 3.6–2.

3.6.4 SUMMARY OF RESPONSE ACTION TAKEN

The USAF and the USEPA, with concurrence of the MEDEP implemented the OU-12 remedial action in September 1999 as presented in the OU-12 ROD (HLA, 1999c). The following subsections assess compliance with major components of the remedy.

3.6.4.1 Performance Assessment

Establishment of GMZs

In accordance with the OU-12 ROD, the USAF established GMZs based on the interpretation of site-specific groundwater contaminant distribution data collected in the OU-12 RI. The GMZs are presented in Figure 4-1 of the *OU 12 Long Term Monitoring Plan (LTMP)* (HLA, 1999d) transmitted in November 1999. The OU-12 LTMP also acknowledged that fieldwork activities to establish the final GMZ 4 (Quarry plume) compliance boundary were ongoing at the time of publication.

Groundwater Use Restrictions

Property within the OU-12 Groundwater Use Restriction Areas is under a long-term lease to the LDA. The lease prohibits the LDA from installing wells or engaging in any other activity that may impact the USAF environmental restoration program without approval of the USAF and Air Force coordination with applicable Federal and State regulatory agencies as necessary.

Provision Of Water Supply

The USAF currently provides water to the LDA through provision of caretaker funds to operate the Madawaska Dam water treatment facility. The Madawaska Dam water treatment facility is under long-term lease to the LDA.

Long-Term Monitoring

The OU-12 LTMP was transmitted in November 1999. The first round of LTM was completed in the fall of 1999. The first annual monitoring report is planned for transmittal in September 2000.

Contingency Action

Contaminated groundwater was detected beyond the compliance boundary for GMZ 4 during the Fall 1999 sampling event. There are no apparent receptors in the affected area. Additional monitoring wells will be installed to determine the extent of the contaminated groundwater zone and the compliance boundary for GMZ 4 will be revised with concurrence of USEPA and MEDEP. An Explanation of Significant Differences to the Operable Unit 12 ROD is planned for completion by September 2000 to document the changes.

Five-Year Site Reviews

This is the first five-year site review. The first annual monitoring report has not been completed. There are insufficient data to conduct statistical/trend analysis or reassess cleanup time estimates at this time. These requirements will be met in the annual monitoring reports and will be available for the second five-year site review. The OU-12 ROD also made additional requirements for the five-year site review regarding evaluation of alternate technologies for remediation of the groundwater within the TI Zones within the ES/JEBS plumes and the Quarry plume. The USAF has not identified any new technologies since publication of the OU-12 ROD.

DNAPL Reduction Program, Quarry Site

The USAF requested $250,000 for a limited scale implementation of DNAPL mass reduction technologies at the Quarry site in FY2000. The consensus statement, *Quarry Site DNAPL Mass Reduction Technology Demonstration Program,* (15 May 2000) was developed. The funds have been provided in accordance with the provisions of the ROD.

3.6.4.2 Standards Assessment (ARARs)

Chemical Specific ARARs

Chemical-specific ARARs were used during development of the RGs and have not changed since publication of the OU-12 ROD.

Location-Specific ARARs

Location-specific ARARs regarding potential impacts to wetlands are being met. No new endangered species have been identified at LAFB since publication of the OU-12 ROD.

Action-Specific ARARs

Action-specific ARARs regarding management of IDW are being met. The OU-12 LTMP meets the action-specific requirements regarding surface water monitoring and monitored natural attenuation. There has been no change in the Maine Statewide Water Quality Criteria nor have the Federal requirements for monitored natural attenuation changed since publication of the OU-12 ROD.

The response actions taken for OU-12 complies with the ARARs presented in the ROD except within the TI Zones for the ES/JEBS plumes and the Quarry plume, where compliance with chemical specific ARARs is waived.

3.6.5 RESULTS AND RECOMMENDATIONS

The following subsections list the results of the five-year review and the recommendations.

3.6.5.1 Results

The major components of the OU-12 remedy have been implemented by the USAF. The remedy for OU-12 is expected to be protective of human health and the environment upon completion and immediate threats have been addressed.

There are not yet enough data to determine whether the remedy is operating properly and successfully (OPS).

3.6.5.2 Recommendations

The USAF should continue to implement the major components of the remedy.

The USAF will develop, in consultation with USEPA and Maine DEP, the specific use restrictions to be included in any leases or deeds or any other property transfer documents governing transfer of any portions of LAFB property that are affected by the OU-12 ROD. In

accordance with the OU-12 ROD, these restrictions will restrict certain activities within the OU-12 Groundwater Use Restriction Areas that may impact the remedy.

An institutional control will be implemented for property owned by Consolidated Rambler Mines, located west of the Quarry. The Air Force is negotiating with the landowner to acquire a groundwater use restriction. The use restriction will run with the property until remediation is complete and agreed upon between the USAF, the USEPA and the Maine DEP. This "Deed" is expected to be finalized by June 2001.

The BCT will revise the Compliance Boundary for GMZ 4.

The USAF will revise the Installation-Wide Quality Program Plan to include the additional GMZ 4 monitoring requirements.

The USEPA will make the OU-12 OPS determination as soon as the LTM data are sufficient to support the determination.

The USAF will distribute the DNAPL Reduction Program, Quarry Site funds.

3.6.5.3 Statement on Protectiveness

The remedy selected for OU 12 currently is not protective of human health. However, once the compliance and institutional control boundaries for GMZ 4 are revised and institutional controls are in place, the remedy selected for OU 12 will be protective of human health and the environment.

3.6.5.4 Five-Year Reviews

The next five-year review for OU 12 will be conducted in 2005.

3.6.6 REFERENCES

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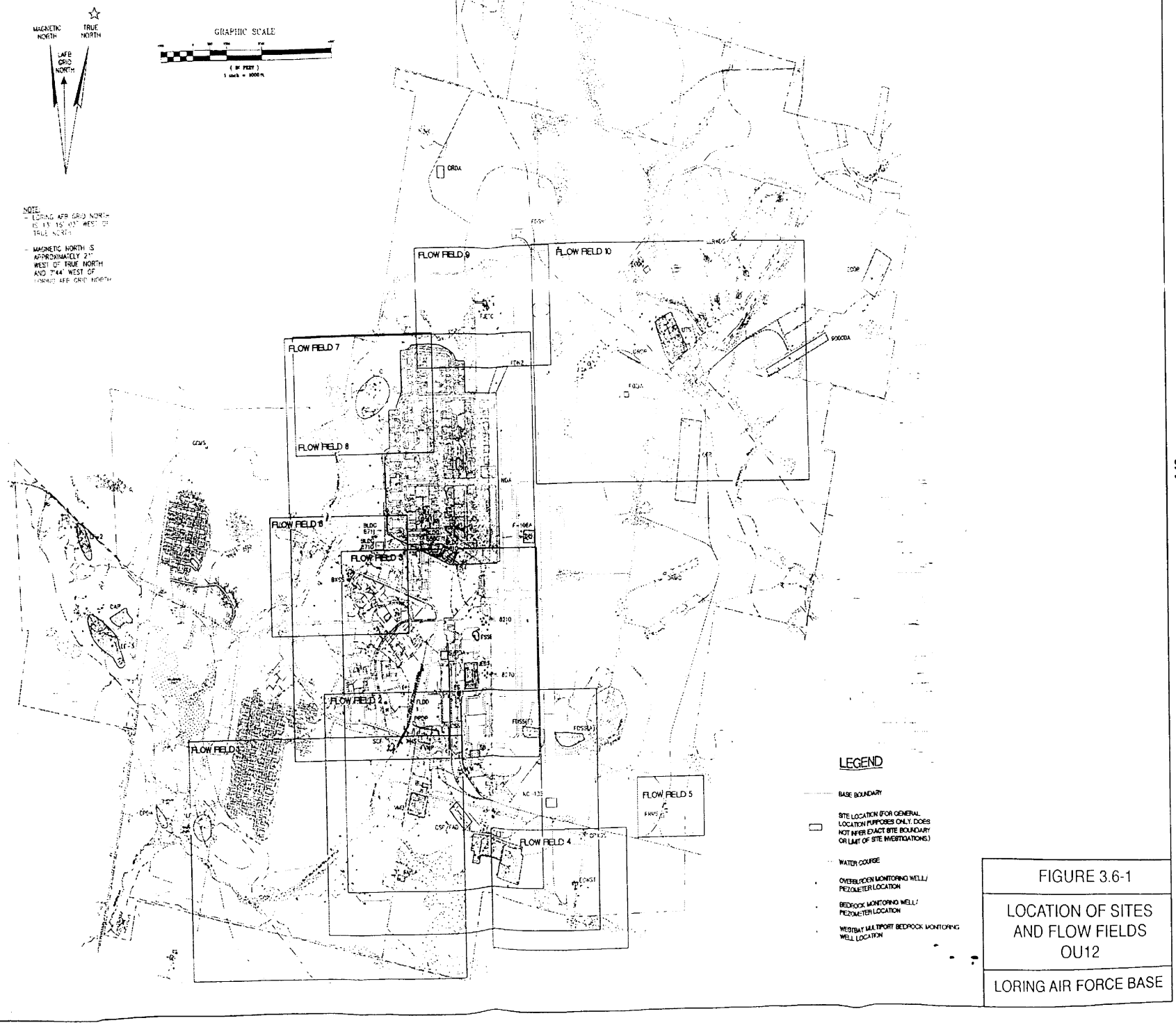

FIGURE 3.6-1

LOCATION OF SITES AND FLOW FIELDS OU12

LORING AIR FORCE BASE

TABLE 3.6-1
SUMMARY OF REMEDIATION GOALS FOR GMZ 1

OU 12 LONG-TERM MONITORING PLAN
LORING AIR FORCE BASE

Chemical of Concern [1] Parameter	CONTAMINATED GROUNDWATER AREA RGs BY PLUME											Compliance Boundary RGs
	CNDA	PH 8210	FSSB	JEBS North	ES/JEBS South	CSS	FLDD North	FLDD South	BL	VMB	RMSA	
Volatile Organics												
1,1,1-Trichloroethane												200
1,2-Dichoroethane			200				200					5
Benzene						5	5	5		5		5
cis-1,2-Dichloroethene	5	5			5		5	5	5	5		5
Ethylbenzene				70	70	70	70	70		70		70
Methylene Chloride		700										700
Naphthalene		5				5	5					5
Tetrachloroethylene	480	480		480	480		480	480				25
Toluene	5							5	5	5		3
Trichloroethylene							1000	1000		1000		1000
Vinyl Chloride	5			5	5		5	5	5	5		5
Xylene	2			2	2	2	2	2		2	2	0.15
												600
Inorganics												
Antimony							6	6				6
Iron (overburden only)		2527					2527					2527
Lead			15		15	15	15	15		15	15	15
Manganese		396	396	396	396	396	396	396	396	396	396	200
PHCs [2]												361

NOTES:

[1] All concentrations are in micrograms per liter (µg/L)

[2] There is no Contaminated Groundwater Area RG for PHCs; however, there is a risk-based screening value (i.e., 361 µg/L) for monitoring PHCs at the GMZ Compliance Boundary.

BL=Base Laundry
BXSS=Base Exchange Service Station
CNDA= Central Nose Dock Area
CSS=Contractor Storage Shed
ES=Enotmology Shop
FJETC=Former Jet Engine Test Cell
FLDD=Flightline Drainage Ditch
FSSB=Former Solvent Storage Building
GMZ=Groundwater Management Zone
JEBS=Jet Engine Buildup Shop
PH = pumphouse
PHC = petroleum hydrocarbons
RG = Remediation Goal
RMSA=Refueling Maintainence Shop
VMB= Vehicle Maintainence Building

TABLE 3.6-2
SUMMARY OF REMEDIATION GOALS FOR GMZs 2,3,4,5 AND 6

OU 12 LONG-TERM MONITORING PLAN
LORING AIR FORCE BASE

Chemical of Concern [1] Parameter	GMZ 2		GMZ 3				GMZ 4		GMZ 5		GMZ 6	
	FTF	Compliance Boundary	Upgradient BXSS	Building 8711	BXSS	Compliance Boundary	Quarry	Compliance Boundary	FJETC	Compliance Boundary	FTA	Compliance Boundary
Volatile Organics											530	530
4-Methyl-2-pentanone							7	7				
1,1-Dichloroethene							5	5				
1,2-Dichoroethane					5	5	5	5	5	5	5	5
Benzene							5	2.7			5	2.7
Carbon Tetrachloride								100				
Chloroform											2.2	3
Chloromethane							70	70	70	70		
cis-1,2-Dichloroethene							700	700				
Ethylbenzene					3080	50						
Methyl-Tert-butyl ether							480	25	480	25	480	25
Naphthalene				5		3	5	3			5	3
Tetrachloroethylene	5	3					1000	1000				
Toluene			5	5		5	5	5	5	5	5	5
Trichloroethylene							2	0.15	2	0.15	2	0.15
Vinyl Chloride	2	0.15								600		600
Xylene												
				0.5		0.1						
PCBs												
Inorganics											5	5
Cadmium											8330	8330
Iron (Bedrock only)											15	15
Lead											396	200
Manganese (Bedrock only)												
PHCs [2]						361		361		361		361

NOTES:

[1] All concentrations are in micrograms per liter (µg/L)

[2] There is no Contaminated Groundwater Area Remediation Goal for PHCs; however, there is a risk-based screening value (i.e., 361 µg/L) for monitoring PHCs at the GMZ Compliance Boundary.

BXSS=Base Exchange Service Station
FJETC=Former Jet Engine Test Cell
FTA=Fire Training Area
FTF=Fuels Tank Farm
GMZ=Groundwater Management Zone
PCBs= polychlorinated biphenyls
PHC = petroleum hydrocarbons

SECTION 3.7

OPERABLE UNIT 13
BASEWIDE SURFACE WATER / SEDIMENT

3.7.1 SCOPE AND NATURE OF FIVE-YEAR REVIEW

The USAF, in coordination with the USEPA, conducted this review of the OU-13 site pursuant to CERCLA § 121(c), NCP § 300.400(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991) and 9355.7-02A (June 26, 1994). It is a policy review. The short-term components of the remedial action at the OU-13 site were initiated in 1997 and completed in 1998. The long-term components of the remedial action at the OU-13 site (i.e. Fish Advisory, LTM) are ongoing. The purpose of the review at the OU-13 site is to assess the effectiveness of the completed activities at achieving the RAOs. This document has been prepared within the scope of a level Ia review.

3.7.2 SUMMARY OF SITE CONDITIONS

3.7.2.1 Site Location and Description

OU-13 is the basewide surface water and sediment operable unit. OU-13 assesses the surface water and sediment conditions at LAFB and the immediate areas surrounding the former LAFB. OU-13 includes brooks, streams, ditches, lakes, ponds, and wetlands in approximately 30 square miles (19,250 acres) of watershed encompassing the former LAFB. Because of the size of the area, and the number of drainage systems involved, OU-13 was subdivided into three primary study areas (see Figure 3.7-1). The study areas are the three major watersheds that comprise the terrain in and surrounding LAFB. These are:

- Wolverton Brook/Brandy Brook Study Area (WB/BB)
- Greenlaw Brook Study Area
- Butterfield Brook/Limestone Stream Study Area (BB/LS)

Wolverton Brook/Brandy Brook Study Area

The WB/BB Study Area is located along the western side of LAFB and is approximately 4,600 acres in size (see Figure 3.7-2). Base property within this study area covers approximately 700 acres. These brooks receive runoff from the western edge of LAFB and areas west of the base, and flow southwesterly into the LMR. The LMR is a relatively broad but shallow river located approximately 1.5 miles west of the base boundary. The LMR flows south approximately 7 miles and merges with the Aroostook River.

Greenlaw Brook Study Area

Greenlaw Brook, the principal on-base drainageway, consists of the East Branch and the West Branch, which merge and flow southwesterly into the LMR. The EBGB and WBGB, and their respective drainage areas together are approximately 7,500 acres in size. The FLDD and the FLDD Wetland constitute a tributary to the EBGB and receive runoff and storm drain discharge from the primary operations areas in the central portion of LAFB. A Spill Containment Facility (SCF), designed to remove and contain floating petroleum products caused by spills or releases, is located next to the FLDD south of Weinman Road.

Flightline Drainage Ditch and Corresponding Wetland

The FLDD and FLDD Wetland are located in the south-central portion of LAFB, west of the FLA and Pennsylvania Road (see Figures 3.7 – 3 and 3.7 – 4). The FLDD receives the majority of stormwater runoff from the NDA, runways, and FLA via an extensive storm drainage system. Several culverts and drainage ditches discharge stormwater into the FLDD. The FLDD is an unlined drainage channel, 20 to 25 feet wide and more than 2,500 feet long. The FLDD extends from the outfall of three 4-foot diameter storm drain culverts southward to the SCF diversion weir at Weinman Road. South of the SCF discharge, flow in the FLDD drainage continues southward through the FLDD Wetland. This wetland is approximately 2,000 feet long, with an average width of about 400 feet. Flow from the FLDD Wetland eventually enters the EBGB. Greenlaw Brook, the principal on-base drainage, consists of the East Branch and the West Branch, which merge and flow southwesterly into the LMR.

East Branch of Greenlaw Brook

The EBGB originates in the wetlands near the FTF and flows westerly for approximately 2,500 feet before merging with the FLDD Wetland drainage (see Figure 3.7-5). After the confluence with the FLDD Wetland area, the brook continues to flow westerly, and merges with the WBGB. The EBGB is generally a narrow, shallow stream, except in wetland areas, where it broadens.

West Branch of Greenlaw Brook

The WBGB originates northwest of the FLA, west of the base boundary. The WBGB flows southward onto base property, passing west of the Quarry and NDA, and into Malabeam Lake (see Figures 3.7-6 and 3.7-7). The WBGB exits the southern end of Malabeam Lake, continues southward into Chapman Pit, and subsequently merges with the EBGB. The total length of the WBGB is approximately 3.4 miles.

Butterfield Brook/Limestone Stream Study Area

The BB/LS Study Area (see Figure 3.7-8) includes the northeastern and eastern portions of the base and is approximately 7,150 acres in size. Base property within the study area covers approximately 5,100 acres. The headwaters of Butterfield Brook are north of the base

boundary. Principal drainage systems in the study area include Willard and Butterfield Brooks in the north and Limestone Stream in the south. Butterfield Brook drains roughly the eastern third of the Base, flows southeasterly into Durepo Reservoir, and becomes Limestone Stream below the reservoir dam. Limestone Stream flows southerly approximately 11 miles, and then merges with the Aroostook River. Contaminants detected within the study area are likely the result of a combination of base- and non-base-related activities. Butterfield Brook and its northern tributaries appear to be impacted by runoff from agricultural field activity north of the base.

3.7.2.2 Site History

Little is known of the source of contamination in OU-13. Much of the contamination was likely due to non-point source releases from base and non-base related activities. The RI focused on assessing current conditions and hazards. This section will summarize the detected contaminants and describe the pre-remedial response activities taken by the Air Force upon evaluation of the nine years of soil, surface water and sediment data. A more complete description of the OU-13 study areas is presented in the OU-13 RI Report (ABB-ES, 1997a).

Wolverton Brook/Brandy Brook Study Area

The OU-13 ROD (ABB-ES, 1997b) recommended NFA for surface water and sediment in the WB/BB Study Area; therefore, this study area was not evaluated in this review. Section 6.0 of the OU-13 RI report (ABB-ES, 1997a) presents the site characteristics of the WB/BB Study Area.

Greenlaw Brook Study Area

The primary contaminants detected in the FLDD and FLDD Wetland include PAHs, PCBs, pesticides, TPH, and lead. The primary contaminants in the EBGB include PAHs, PCBs, pesticides, TPH, and lead. PCBs have also been detected in fish tissue in the EBGB. Contaminants detected in the WBGB are predominantly the result of base-related activities; however, some potential exists for non-base-related contaminants to also enter the WBGB. The primary contaminants in the WBGB, specifically in the NDA drainageways that originate on the western side of the NDA, include PAHs and inorganics.

Butterfield Brook/Limestone Stream Study Area

Contaminants detected within the study area are a result of a combination of base- and non-base-related activities. Butterfield Brook and its northern tributaries are believed to be impacted by runoff from agricultural field activity north of the base.

Pre-remedial Response Activities

This section describes the pre-remedial response activities taken at various locations within OU-13. A Fish Advisory was issued by the Maine Department of Human Services (DHS) in May 1996 warning against ingestion of fish from certain water bodies within and around the former LAFB. These areas include Chapman Pit, Green Pond, Greenlaw Brook, and the LMR and its tributaries from the Madawaska Dam Reservoir south to the Aroostook River.

A time-critical removal action was completed in 1996 that included removal of PCB-contaminated sediment from Ditch G12; removal of soil and sediment from Ditch G11; and cleaning of storm drains and catch basins from the Steam Plant to the head of Ditch G12.

3.7.3 SUMMARY OF RESPONSE ACTION SELECTED

The selected remedy for OU-13 includes two remedial alternatives; Removal - Disposal and No Action. No further action is necessary for much of OU-13 because there is no unacceptable risk to human health or the environment.

Removal - Disposal is the selected remedy for areas within OU-13 that exceed RGs. These areas have been identified to include:

- FLDD
- FLDD Wetland
- EBGB (from Pennsylvania Road to the Ski Chalet)
- NDA Drainageways (north and south)
- Ditch G06
- Underground Transformer Site (UTS) Wetland (northern portion)

The State Fish Advisory, currently in effect, will continue to be enforced until the fish are determined to be acceptable for consumption. Areas covered by the advisory include Chapman Pit, Green Pond, Greenlaw Brook, and the LMR and its tributaries from the Madawaska Dam Reservoir south to the Aroostook River.

The No Action alternative has been selected for the LMR because there is no unacceptable risk associated with surface soil, sediment, and surface water. The No Action alternative will include an environmental monitoring program and five-year site reviews to assess whether human health and the environment continue to be adequately protected.

No further action is necessary at the other areas within OU-13 because there is no unacceptable risk to human health or the environment.

3.7.3.1 Remediation Goals

The USAF established, with concurrence of the regulatory agencies, site-specific RGs that will be protective of human health and the environment. RGs and the compounds for which they have been established are listed in Table 3.7-1.

3.7.3.1 Components of the Remedy

The following subsections describe the Removal - Disposal and No Action alternatives developed by the USAF for OU-13.

Removal – Disposal

The following paragraphs describe the Removal - Disposal alternative the USAF developed for areas that exceed RGs. These areas have been identified to include the FLDD, FLDD Wetland, EBGB (from Pennsylvania Road to the Ski Chalet), north and south NDA Drainageways, Ditch G06, and UTS Wetland (northern portion). Implementation of the selected alternative will include the following activities:

- Pre-design studies to delineate the extent of remediation for design purposes;
- Pre-design wetland mitigation studies (i.e., wetland delineations and function-value assessments) to evaluate the impacts resulting from remedial activities;
- Site preparation and mobilization;
- Cutting and clearing;
- Stormwater management;
- Sediment excavation;
- Sediment disposal at LF-3; some material may require disposal at off-base facilities;
- Backfilling the excavations with material that closely matches the excavated material;
- Compensatory wetlands mitigation and demobilization;
- Long-term environmental and wetlands mitigation monitoring;
- Continued fish advisory for Chapman Pit, Green Pond, Greenlaw Brook, and the LMR and its tributaries from the Madawaska Dam Reservoir south to the Aroostook River; and
- Five-year site reviews.

No Action Alternative

The No Action alternative has been selected for surface soil, sediment, and surface water for the LMR because there is no unacceptable risk associated with these media. The No Action alternative does not include any remedial action components to reduce or control risks. However, the No Action alternative will include an environmental monitoring program to assess the long-term conditions of the site's ecology. The ecological effects will be assessed by comparing the LTM results to baseline conditions established during the baseline ecological RA conducted as part of the OU-13 RI (ABB-ES, 1997a).

The No Action alternative will also include five-year site reviews. The long-term environmental monitoring data will be evaluated during the five-year site reviews to assess whether human health and the environment are adequately protected.

No further action is necessary for the remaining areas in OU-13 because of limited and sporadic contamination, anticipated lack of future impacts, and/or no unacceptable risk to human and ecological receptors.

Remedial Action Objectives

These actions will achieve the following RAOs for OU-13:

- Prevent or minimize ingestion of and dermal contact with contaminated soil/sediment by human and ecological receptors;
- Prevent human ingestion of contaminated fish;
- Minimize migration of contaminated soil/sediment; and
- Avoid destruction of existing ecological habitat where the risk associated with short-term habitat loss outweighs the reduction in risk potentially realized by site remediation.

3.7.4 SUMMARY OF RESPONSE ACTION TAKEN

Based on the pre-construction screening data collected in 1997, the volume of contaminated sediments was larger than anticipated. Specifically, stream and floodplain sediments with contaminant concentrations above the RGs were detected in Greenlaw Brook downstream of the Ski Chalet. As a result, the remedial action construction was completed over two construction seasons rather than one.

The removal and disposal of contaminated sediments along with interim wetlands restoration was completed at several OU-13 locations during the 1997 construction season (BEI, 1998).

The 1997 construction quantities are presented in Table 3.7–2. The 1997 construction season sites are:

- North and South NDA Drainageways,
- UTS Wetland,
- G06 Ditch,
- FLDD,
- FLDD Wetlands,
- Upper portion of EBGB, and
- Stormwater drainlines discharging to these locations.

The remaining OU-13 remedial action construction and demobilization was completed in the 1998 construction season (BEI, 1999). The 1998 activities included the removal and disposal of contaminated sediments from the lower portion of the EBGB and two segments of Greenlaw Brook downstream of the Ski Chalet. As in 1997, wetlands restoration immediately followed confirmation of RG attainment. Construction quantities for 1998 are presented in Table 3.7–3.

Compensatory wetlands mitigation for all CERCLA related wetlands impacts, including OU-13 was accomplished in 1999 through completion of the East Loring Lake Wetlands project (BEI, 2000).

The first year of long-term environmental and wetlands mitigation monitoring was conducted in 1999 in accordance with the *OU-13 Long-Term Monitoring Plan (LTMP)* (HLA, 1998). The results will be reported in the first annual wetlands monitoring report due in February 2000.

The fish advisory was implemented in May 1996 by DHS and remains in effect. It cannot be removed without concurrence of DHS.

3.7.4.1 Performance Assessment

The remedial action construction activities, including in-place in-kind wetlands restoration at the OU-13 sites has been complete for one or two years. The restored wetlands are meeting remedial objectives for success as demonstrated by plant survival and wildlife observation data presented in the first annual environmental and wetlands mitigation report (MW, 2000). The first round of macroinvertebrate tissue sample results was nondetect for all analytes in all samples (MW, 2000). The sampled odonates represent a significant prey item for fish affected by the OU-13 sites. These data present strong evidence that the successful removal

and disposal of contaminated sediments from the OU-13 sites will result in reduced contaminant concentrations in Loring impacted fish.

3.7.4.2 Standards Assessment (ARARs)

The OU-13 remedy meets Federal and State ARARs.

Chemical Specific ARARs

Table 11–1 of the *OU-13 ROD* (ABB-ES, 1997b) presents the chemical-specific ARARs. The Federal Clean Water Act Ambient Water Quality Criteria (CWA AWQC) were used to develop risk-based sediment RGs. The relevant AWQCs have not changed.

Location Specific ARARs

Table 11–2 of the *OU-13 ROD* (ABB-ES, 1997b) presents the Location Specific ARARs. The remedial action impacts to and restoration of affected wetlands on the OU-13 sites was conducted in accordance with the administrative requirements of all applicable Federal and State regulations regarding management of wetlands. Restored wetlands and compensatory wetlands will be monitored and maintained in accordance with all applicable Federal and State regulations regarding management of wetlands.

Action Specific ARARs

Table 11–3 of the *OU-13 ROD* (ABB-ES, 1997b) presents the action-specific ARARs. The removal and disposal of contaminated sediments from the OU-13 sites was conducted in accordance with all applicable Federal and State regulations regarding management of solid waste, hazardous waste and PCB-contaminated sediments.

3.7.5 RESULTS AND RECOMMENDATIONS

3.7.5.1 Results

All the short-term components of the OU-13 remedy are complete and immediate threats have been addressed. The long-term components of the remedy selected for OU-13 (i.e. Fish Advisory, LTM) are expected to be protective of human health and the environment upon completion.

3.7.5.2 Recommendations

Long-term wetlands and environmental monitoring in accordance with the OU-13 LTMP (HLA, 1998) and the Wetlands Mitigation Plans should be continued.

Click here to go to Section 3.7 Figures and Tables

3.7.5.3 Statement on Protectiveness

The remedy selected for OU 13 remains protective of human health and the environment.

3.7.5.4 Five-Year Reviews

The next five-year review will be in 2005.

3.7.6 REFERENCES

ABB-ES, 1997a. *Basewide Surface Water/Sediment Operable Unit (OU-13) Remedial Investigation Report*; Final; Installation Restoration Program; prepared for HAZWRAP; Portland, Maine; April 1997.

ABB-ES, 1997b. *Basewide Surface Water/Sediment OU-13 Record of Decision*; Final; Installation Restoration Program; prepared for HAZWRAP; Portland, Maine; May 1997.

BEI, 1998. *Remediation of Basewide Surface Water / Sediment (OU-13) and Base Exchange Service Station Wetland (OU-5), Remedial Action Interim Report for 1997 Construction Season*, Final, Installation Restoration Program, prepared for AFCEE, Oak Ridge, Tennessee, April, 1998.

BEI, 1999. *FLDD Wetlands, EBGB Wetlands, Greenlaw Brook, and Chapman Pit Manganese Sediment Removal Area, 1997 and 1998 Construction Seasons, Remedial Action Report*, Final, Installation Restoration Program, prepared for AFCEE, Oak Ridge, Tennessee, August, 1999.

BEI, 2000. *East Loring Lake Wetland Mitigation Report*, Final, Installation Restoration Program, prepared for AFCEE, Oak Ridge, Tennessee, January, 2000.

HLA, 1998. *Basewide Surface Water/Sediment OU-13 Long-Term Monitoring Plan*; Final; Installation Restoration Program; prepared for HAZWRAP; Portland, Maine; November 1998.

MW, 2000. *First Annual Loring Environmental and Wetlands Monitoring Report*, Final, Installation Restoration Program, prepared for AFCEE, Malvern, Pennsylvania, January, 2000.